

## Abstract of the Disclosure

### ~~—ABSTRACT~~

This invention relates to a system for estimating the position, speed and orientation of a vehicle (10), ~~comprising means for~~ by determining the components of two noncollinear constant unit vectors  $\hat{g}_b, \hat{e}_b$  according to vehicle body axes; ~~and means for~~ determining the components of ~~said the~~ noncollinear constant unit vectors  $\hat{g}_l, \hat{e}_l$  according to Earth's axes; The system further ~~means for determining~~ determines the three components of angular velocity  $\hat{\omega}_b$  of the vehicle in body axes; ~~means for correcting~~ corrects ~~said the~~ angular velocity  $\hat{\omega}_b$  with a correction  $u_\omega$  and ~~obtaining~~ obtains a corrected angular velocity  $\hat{\omega}_b = \hat{\omega}_b + u_\omega$ ; a control module (14) implementing a control law to calculate ~~said the~~ correction  $u_\omega$ , where ~~said the~~ control law is:

$$u_\omega = \sigma(\hat{g}_b \times \hat{g}_b + \hat{e}_b \times \hat{e}_b) \quad [1]$$

where  $\sigma$  is a positive scalar,

- such that upon using ~~said the~~ corrected angular velocity  $\hat{\omega}_b = \hat{\omega}_b + u_\omega$  as input to a module for integrating the kinematic equations, the latter are stable in the ISS sense and the error in the estimation of the direction cosine matrix  $\hat{B}$  and of the Euler angles  $\hat{\Phi}$  is bounded.